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Development and international cooperation in the twenty-first century: the role of information technology in the context of a knowledge-based global economy

Contribution of the Economic and Social Commission for Western Asia to the theme for the high-level segment of the substantive session of 2000 of the Economic and Social Council

Development and international cooperation in the twenty-first century: the role of information technology in the context of a knowledge-based economy

A regional perspective

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Summary

The President of the Economic and Social Council for the year 2000, in consultation with the Bureau, requested the regional commissions to hold regional intergovernmental or expert group meetings on information technology for development in their respective regions and to report on the outcome of these meetings to the high-level segment of the Council in order to provide a regional perspective on the theme for the high-level segment, entitled "Development and international cooperation in the twenty-first century: the role of information technology in the context of a knowledge-based economy".

All five regional commissions have submitted brief reports based on regional consultative meetings or on views solicited from their member States. The meetings of the ESCAP and ECLAC regions were hosted by the Governments of India and Brazil, respectively, on 20 and 21 June 2000. For its part, ECA held a high-level meeting, as the first African Development Forum, from 24 to 28 October 1999 under the theme "The challenge to Africa of globalization and the information age". ESCWA held its expert group meeting on 15 and 16 May 2000. ECE circulated a draft report to all its member States and comments received are integrated in the Commission's report to the Council.

I. Introduction

1. The present report is based on presentations made, and issues discussed, during the meeting of a panel of experts convened by the Economic and Social Commission for Western Asia (ESCWA) on the theme of "Information technology and development priorities: competing in a knowledge-based global economy", on 15 and 16 May 2000. Around 30 experts took part in the panel. They included around 20 experts from eight ESCWA member countries as well as independent consultants from France and the United States of America.

2. Twenty substantive contributions were presented to the panel in four sessions held under the following themes:

(a) Information technology and the knowledge-based global economy;

(b) The status of information and communications technologies in selected ESCWA member countries;

(c) Capacity-building in priority areas of information and communications technologies;

(d) Emerging issues in information and communications technologies and their applications.

3. These themes were adopted with a view to generating an expert perspective from the ESCWA region for the substantive session of the Economic and Social Council in July 2000. A considerable number of important recommendations were put forward by the experts on issues both directly and indirectly related to those raised in the report of the Secretary-General on the theme under consideration.

4. A more extended version of the present report is being prepared by ESCWA with a full list of the many recommendations made by the panel's experts. In particular, experts participating in the panel reaffirmed the need for concerted action by all concerned parties if worthwhile objectives in information and communication technology (ICT) capacity-building were to be achieved. It was considered that specific initiatives, at the sectoral, national, regional and international levels, constituted suitable vehicles for such cooperation. A special section in the present report is therefore dedicated to those initiatives. Considering the great promise held by ICTs in promoting development efforts and the enormous benefits of international cooperation and coordination of efforts aimed at assisting developing countries in ICT capacity-building, it is considered timely for a global conference on ICTs and sustainable development to be convened under the auspices of the United Nations in 2001.

II. Capacity-building in information and communications technologies and the evolving knowledge-based global economy

5. In essence, the shift to knowledge-based economies, catalyzed and accelerated by advances in ICTs, is integral to the ongoing process of globalization. Questions of inequity between developed and developing countries inherent in the latter process should therefore be viewed alongside the concentration of "knowledge-power" in developed countries. Tackling the serious imbalances likely to come about must be the subject of sustained efforts by all those concerned with sustainable development on the international scene.

6. ICTs are expected to bring about several productivity gains due to more efficient management of resources, decreased distribution costs, elimination of inefficient suppliers and intermediaries, more transparent markets and resulting lower prices. All of these factors will act against economies with old-fashioned or deficient ICT capacity. In particular, dis-intermediation may be expected to pose serious threats to businesses in the ESCWA member countries, particularly those still operating under traditional trade regimes. In order to minimize the impact of such threats, it will be essential to redirect and restructure, traditional trade activities towards new aspects of value creation, including intermediation, using the more modern Internet and e-commerce modalities. In addition, ESCWA member countries will have to exercise great efforts if the expected surge in consumerism that might result from e-commerce is not going to aggravate trade imbalances.

7. ICTs have the potential of engendering plenitude, democratic and participatory practices on the one hand, and inequality, dominance and estrangement on the other. The power inherent in modern ICTs should therefore be exercised with great care and responsibility if the cause of sustainable development

is to be well served. The need to steer a safe course that maximizes benefits and avoids negative outcomes poses challenges for policy makers the world over. In the ESCWA member countries, in particular, issues pertaining to inadequate infrastructures, resource levels and legislative frameworks coupled to cultural and linguistic particularities will need to be taken into account in charting such a course.

8. Developing countries pursuing knowledge-based economic development options will need to place much greater emphasis on technology transfer and development than on physical capital. Additionally, reduced barriers between producers and consumers will highlight demand-side factors with important policy implications that include: promoting demand by ensuring that consumer attitudes are favourable to knowledge products and rendering them available at acceptable costs; and ensuring that private use of new technologies is not hindered.

III. ICT infrastructures and capacity-building

9. Acquiring modern ICT infrastructures constitutes a crucial step in moves to join the global knowledge-based economy. In general, ICT infrastructure indicators for the ESCWA member countries, such as telephone line densities, the rate of access to personal computers and Internet penetration, invariably fall below world averages. Taken as a group, the Gulf Cooperation Council (GCC) countries consistently perform far better than the non-GCC ESCWA member countries. Indeed, the values of the main ICT indicators for some GCC countries, notably the United Arab Emirates, exceed world averages.

10. Privatizing telecommunications facilities has for some time been on the policy agenda in several ESCWA member countries. There are still government monopolies in almost all of these countries, especially insofar as fixed lines are concerned. Jordan is a notable exception with its privatized monopoly service provider overseen by a newly created Telecommunications Regulatory Commission. In Lebanon, parliament has approved a privatization bill which should pave the way for privatizing the telecommunications authority.

11. Building modern ICT infrastructures will have to be firmly based on participatory approaches. Alliances will be needed between a variety of institutional forms, including government departments, local and international enterprises, technology holders and research organizations, even non-governmental organizations (NGOs) concerned with ICT infrastructure-building.

12. Bringing information infrastructures within reach of the general public, in terms of cost and range of dissemination, in the ESCWA member countries is a challenge of considerable proportions. The response to this challenge will need to be based upon serious development efforts involving hardware, software systems and content questions as well as setting priorities in accordance with the requirements of specific ICT application areas, such as e-commerce, e-governance and telemedicine.

IV. ICT capacity-building, issues of policy and implementation

A. Policies, strategies and action plans

13. Ministries of State, high-level governmental and non-governmental bodies and national information centres have recently been set up by ESCWA member countries to promote certain aspects of ICT development. There is an urgent need, nevertheless, to devote far more attention and resources to the formulation of coherent policies, strategies and plans of action aimed at ICT capacity-building and sustained development of existing capabilities. The principal goals of such policies, strategies and action plans should be to provide ESCWA members with improved competitiveness in the knowledge-based global economy and to support their own moves towards creating knowledge-based societies.

14. Efforts aimed at the formulation of cross-cutting national ICT policies in response to national socio-economic development needs should be guided by explicit sectoral, development policies. In fact, there may be a strong need to have sectoral ICT policies closely integrated within sectoral development policies. National and sectoral science and technology policies should also be revisited in designing national ICT policies owing to the close bonds that link capacity-building in ICT to overall technological capabilities.

15. There is a need for national ICT policies, and related strategies and action plans, to address

objectives within two time-frames, involving, in the long and medium terms, goals such as instituting change in attitudes and revolutionizing educational systems. In order to cope with accelerating technological and global economic development, more urgent objectives should be targeted in the short term, including the adoption of interim ICT capacity-building measures, specialized institution-building, urgent human resource development programmes and the achievement of specific ICT capabilities in selected priority sectors/segments.

16. Additionally, the need to set national and sectoral ICT policy objectives that are based on actual demand considerations and established needs rather than supply-, or technology-push considerations, is to be emphasized.

17. Several priority issues must be tackled by the above-mentioned policies, strategies and action plans. At the forefront are questions of infrastructure-building, resources, both human and financial, in addition to legislative and regulatory questions. Alliances and cooperative ventures with operators inside and outside the ESCWA member countries may have to be sought. Additionally, policies relevant to securing research and development (R and D) capabilities for adapting and developing ICTs must be high on the list of national ICT policy priorities.

B. Legislation, regulations and standards

18. Legislation conducive to ICT capacity-building is urgently needed in the ESCWA member countries. In particular, attention is drawn to the need for accelerating the deregulation of the telecommunications sector with a view to promoting competition and providing a wider range of services at lower costs.

19. Intellectual property rights laws and corresponding regulations for their enforcement constitute another area for priority attention, as do laws to regulate transactions over the Internet, including commercial exchange, with particular attention to consumer protection and fraud prevention.

20. Laws and relevant regulations in the field of communications should also permit firms ready and affordable access to the Internet and to international telecommunications carriers with emphasis on promoting e-commerce. Furthermore, legislation is needed to provide ICT industries with incentives on a par with other industrial sectors.

21. National privacy acts based on the Universal Declaration of Human Rights and related norms, such as article 12 of the Declaration, will need to be promulgated in a manner that maintains balance between the privacy, necessary secrecy of commercial transactions and unimpeded flow of information for the public good.

22. Legislating for the adoption of national and regional standards in conformity with international ones will allow easy upgrading of ICT capabilities to accommodate technological change as well as promote international exchange. In particular, adoption of standard international procedures for encryption and digital signatures will facilitate and ensure the security of web-based transactions.

V. Resources for ICT capacity-building

A. Funding of capacity-building in ICT

23. Securing an adequate and sustained flow of financial resources for ICT capacity-building is a task that requires novel modalities and closer cooperation between Governments, the private sector, investment institutions and donor organizations. Government funding of ICT activities on many fronts will be essential, especially in the initial stages of capacity-building, preceding maturity of ICT enterprises and dissemination of specific ICT applications.

24. In essence, it will be necessary to address the creation of conditions supportive of bids by national, regional and international capital markets to provide venture capital and investment funds for launching ICT enterprises. Additionally, there will be a need to provide incentives and regulatory schemes that support and enhance efforts by the private sector in human resource development as well as infrastructure- and institution-building.

B. Human resource development

25. An overarching goal of ICT capacity-building in the ESCWA member countries is to create an innovative human resource base. This would naturally

require sustained efforts on several fronts. More immediate objectives include, in the medium and long terms, modernization of educational curricula in general and the introduction of new modalities for human resource development based on more recent ICT advances, such as distance education and computer-aided instruction. An objective to be targeted within shorter time horizons is the provision of specific professional development and training courses in cooperation with end-user enterprises, focusing on various sectors where individual ESCWA member countries can compete, such as health, the airline and tourism industries, trade and government services. All three objectives merit focused attention and enhanced resource allocations. Several tasks will need to be tackled in approaching these objectives, including the introduction of new computer education curricula at the earliest possible age and regulating ICT professions in line with other professions.

VI. New institutional forms and special initiatives

26. Organizations devoted to networking and coordination will constitute the mainstay of future knowledge-based institutional entities. Capitalizing on modern ICT developments with a view to the creation of "virtual institutional entities" through networking concerned new and existing institutions is in need of close attention by the ESCWA member countries. The primary objective of setting up such entities would be to harmonize and coordinate ICT capacity-building in the member countries, subsequently enhancing the productivity of national economies and overall regional competitiveness within the context of the global knowledge-based economy.

27. The fact that viable national ICT capabilities are normally created with a view to effectively linking to the world at large and to surrounding countries, in particular, presupposes close regional and international cooperation and coordination and favours the adoption of regional and international initiatives as well as national ones.

A. International initiatives

28. Novel approaches are needed in the design and implementation of international ICT initiatives. The dynamism and technical competence of business enterprises, coupled with the development expertise and impartiality of government departments, NGOs, United Nations organizations and donor agencies, should contribute effectively to bridging the ever-widening digital divide.

29. With this latter point in mind, it is considered timely to convene, under the auspices of the United Nations, an international conference devoted to deliberating current trends in the emerging global knowledge-based economy, ICT capacity-building and development priorities in the twenty-first century. This conference should be designed along the lines adopted in other international conferences convened during the past decade. The opportunity of the upcoming Millennium Assembly could be a suitable juncture for conducting preliminary preparations for such a conference. One of the valuable outcomes of such a conference would be to create an opportunity for the international community, as a whole, to take stock of past developments and ponder future prospects. It would also provide countries of the world, particularly developing ones, with a grand opportunity to reassess their ICT infrastructures, revisit their national ICT policies and come out with initial national and regional plans of action that might be further refined as a result of the conference's deliberations.

30. Contributing to efforts by developing countries to join the knowledge-based global economy should be high on the agenda of such a conference. Thus, the conference could be designed to tackle the obstacles facing developing countries in access to modern ICTs in particular, and could pave the way towards the creation of international and regional consortia aimed at ICT infrastructure-building in the developing countries. Issues concerning new standards in various ICTs and their application areas might also be included in the conference's agenda. Priorities for future R and D activity could also be usefully debated and frameworks for promoting R and D efforts in selected ICTs and areas of application put forward.

B. Regional initiatives

31. Economic, social, cultural and linguistic factors permit the design of initiatives that capitalize on regional similarities and complementarities in ICT capacity-building within the ESCWA member countries and with other neighbouring Arab countries. Such

initiatives would ensure higher levels of connectivity and harmony of standards as well as conserve resources.

32. Public and private sector institutions concerned with ICT capacity-building in the region should therefore join forces with those involved in promoting ICT applications and those concerned with socio-economic development in undertaking special initiatives aimed at accelerating the adoption of rational and cost-effective approaches to ICT capacity-building.

33. A proposal put forward by a regional NGO at the meeting addressed the launching of a broad-based regional initiative designated the "Arab Knowledge Society Initiative (AKSI)". Goals set for this initiative include promoting ICTs and their applications in the region's economies and fostering their integration within the knowledge-based global economy.

34. At the above-mentioned meeting, it was proposed that the ESCWA secretariat undertake, in cooperation with other United Nations organizations as well as concerned international and regional bodies and NGOs, to identify modalities, networking arrangements and funding resources for the launching of that initiative in 2001. Regional meetings might be convened with that end in view. Such meetings would also serve as preparations for the above-mentioned international conference.

C. National ICT capacity-building initiatives

35. Considering the fact that ICT capacity in many ESCWA member countries is significantly below the world average and taking into account the rapid advances in ICTs, there is a need to reorganize in preparation for intensive and urgent action at the national level. It would therefore be opportune to launch, early in 2001, national initiatives aimed at ICT capacity-building with the formulation of national and sectoral ICT policies as a first priority. Governments would need to play a leading role in launching, supporting and monitoring progress of these initiatives. However, since many aspects of such initiatives will involve enterprises and civil society institutions, a participatory approach in their design will be an optimal choice.

36. Implementation strategies and action plans based on national and sectoral ICT policies developed as a result of the above-mentioned initiatives will need to possess set goals with provisional budgets and numerical human resource development targets as well as explicit modalities to ensure their execution within acceptable time horizons.

37. Apart from the formulation of national and sectoral policies, strategies and action plans, the above-mentioned national initiatives would also need to focus on setting up information-gathering and policy-analysis entities to promote specific ICT applications and tackle problems related to their implementation. Devising mechanisms for providing ICT enterprises with support, at least in the initial stages of their operation, is another area that has to be addressed through the national initiatives. Establishing ICT incubators within or close to universities and research centres in close proximity to technology parks and free zones would also need to be considered by national initiatives. The example of the Dubai Internet City, in the United Arab Emirates, is a case in point in this regard. Its progress should be monitored to guide future efforts along the same lines.

VII. Specific ICT applications

A. Distance education

38. Computer-aided instruction and Internet-based distance education hold enormous promise for disseminating quality higher education as well as technical and vocational training in these countries. Two important considerations will limit their dissemination, however. The first is the need to develop vast amounts of course material within relatively short periods for such systems to take off with any measure of success. The second is the fact that Internet access is still constrained for large student-age populations in terms of both physical facilities and cost.

39. Addressing these two difficulties will necessitate new modes of cooperation among universities in the region as well as outside. The role of United Nations organizations and specialized agencies, acting in cooperation with regional and national educational authorities, will be instrumental in securing plans for pilot activities which may then be followed by wide-

ranging initiatives aimed at extending the reach of educational and training institutions beyond campus boundaries.

B. Telemedicine

40. Introducing ICT applications in the field of health care through telemedicine schemes will require significant restructuring and integration of national policies and management practices. Furthermore, in building national and regional telemedicine capabilities, it is advisable to adopt a heuristic and gradual approach with well-defined targets and close monitoring arrangements. Pilot projects, preferably of regional and international as well as national character, may be conducted in selected priority areas, with help from United Nations and other international organizations, such as the World Health Organization, the United Nations Children's Fund and the International Telecommunication Union. Such projects should facilitate the accumulation of useful experience in telemedicine applications. In selecting these projects, it will be important to assess the value it would have in imparting skills for the design and implementation of full-fledged national and regional telemedicine initiatives. It would also be essential to ensure that such projects possess well-defined objectives and respond to established public needs.

C. E-commerce

41. Advances in ICTs, with the Internet in the forefront, offer enterprises unlimited visibility and vastly improved abilities to access markets and reduce operating costs. These same advances also place enterprises squarely in the face of unimaginably stiff competition in the open, global cyber-market. In general, enterprises that do not attain a firm grasp of ICT advances will be relegated to marginal positions, with dire consequences for socio-economic development.

42. In general, widespread use of the Internet to conclude business transactions must await developments on several fronts, including:

(a) Wider dissemination of the capacity to use the Internet by the variety of benefiting business enterprises;

(b) Agreement on systems that allow secure Internet transactions;

(c) The design of acceptable modalities for taxing Internet transactions;

(d) Formulation of measures for dispute settlement.

D. E-governance

43. But for their cost, which still renders them inaccessible to large cross-sections of developing country populations, ICTs are inherently democratic and enabling. Two obstacles will determine the level of penetration achieved by ICT-based systems in the running of community affairs at any level: national and local policies that permit their utilization, on the one hand, and schemes that render them more accessible to the general public, on the other. In the ESCWA member countries, the latter hindrance is not merely cost-related. Language difficulties and basic skills are factors that need to be taken into account in attempts at the introduction of e-governance schemes and dissemination of on-line democracy. While cost issues may be amenable to short-term solutions, language and skill issues might be expected to require sustained efforts over longer periods.

44. Gradual, multi-faceted and participatory approaches are therefore called for in promoting e-governance in the ESCWA member countries and should be adopted as core strategies in the design of long- and medium-term e-governance initiatives. Meantime, in promoting Internet-based ICT applications aimed at streamlining government interaction with the public, care should be taken to improve transparency and provide better services to communities at large.

45. In essence, the fact that significant dissemination of e-governance schemes is contingent upon various developments in a variety of areas, such as machine translation and digital literacy, lends further support to the argument for broad-based national and regional ICT initiatives.

E. ICTs and employment

46. Maximizing ICT benefits on employment in the ESCWA member countries is contingent upon adoption

of policies conducive to ICT ventures targeting the manufacture, development and adaptation of software and hardware systems as well as associated services. Introduction of ICT applications, including health care, distance education, e-commerce and e-banking, will create further demand for ICT specialists with emphasis on specific software products. Meeting such demand with the help of locally trained manpower will play an important role in enhancing the productivity and competitiveness of ESCWA members' economies. This, however, will necessitate radical, qualitative and quantitative change in human resource development processes. At the same time, there will be a strong need to raise the level of computer literacy at the national level and to adopt measures that encourage, in particular, software development and communications enterprises and improve their chances of competing on the world markets.

F. Gender and ICT capacity-building

47. One of the more encouraging trends in human resource development in the ESCWA member countries is that many more women now graduate with university degrees than at any time in the past. This is a general trend extending throughout ESCWA member countries, including the GCC countries.

48. Additionally, many more women now take up science and technology courses of study. A sizeable proportion of these women should constitute valuable assets in national ICT capacity-building, providing a sizeable proportion of skilled qualified women with job opportunities in an area that suffers from human resource deficits. The networking benefits of the Internet may also allow women to form associations and income-generating small and medium-sized enterprises.

49. Needless to say, and although encouraging signs are already apparent, such transformations will not take place spontaneously. Considerable attention should be devoted to national networking and infrastructure building. The role played by NGOs in this domain is of paramount importance.

VIII. New organizational roles and cooperation modalities in ICT capacity-building

A. Roles of Governments

50. Despite the need for concerted action in ICT capacity-building by a variety of organizations, many tasks will remain the preserve of Governments. Among them are the formulation of policies, strategies and action plans for acquiring modern ICTs and their application, the promulgation of relevant legislation and regulatory instruments, coordinating the formulation of standards and overseeing their enforcement, creating incentives for private enterprise, and promoting specific application, with emphasis on the ICT requirements of disadvantaged groups. A key task for Governments will be to provide support for ICT capacity-building, with emphasis on maintaining quality services at reasonable costs for all as a primary objective in national socio-economic planning. This will often require the adoption of measures to encourage national, regional and international investments in building modern ICT infrastructures, running ICT production and services facilities and other investments needed to create knowledge-based societies. Introducing reforms to provide tax abatements and incentives for start-up ICT enterprises will also play an important part in inducing national ICT enterprises to participate in national and international bids.

51. Introducing ICTs in public administration and encouraging the participation of national enterprises in building e-governance infrastructures are two related tasks in which Governments will need to take the initiative. With respect to the first task, emphasis should be placed on providing greater transparency and improved services for the citizenry at large.

52. Introducing measures and enforcing regulations to secure safe e-commerce and e-banking services is another area where Governments will need to maintain a principal role in consultation with all concerned parties. Adopting and enforcing international best practices in resolving disputes relating to on-line transactions and taking part in the continual evolution of such practices is also expected to be a principal task for Governments in the near future.

B. Roles of private enterprise

53. The development of software and hardware systems for, *inter alia*, education, telemedicine and e-governance should provide impetus for new entrepreneurial ventures. To capitalize on these opportunities, entrepreneurs would need to emphasize quality and longer-term gains at the expense of immediate returns. This will require paradigmatic shifts in accessing investment capital and in management practices. Furthermore, inter-firm and university-firm cooperation in pre-competitive research should ease the burdens of investment capital scarcity and long-term research. Immense opportunities would seem to exist in research activity targeting advanced computer software systems that facilitate knowledge creation and management using the Arabic language.

54. Establishing national and regional centres of excellence for software R and D and advanced training of software researchers and developers at the national and regional levels should be considered by relevant business enterprises in cooperation with national educational and research institutions.

55. Private/public sector cooperation would also benefit greatly from specific activities, for example setting up "technology incubators" and "technology free zones" with emphasis on selected priority areas, including software development; creating joint public/private sector bodies to conduct prospective research regarding the international market's needs; and enabling national or regional banks and financial institutions to act as guarantors for small and medium-sized technology firms. Finally, regional "communities of practice" should be established to share best practices among peers in priority areas, and to conduct outreach programmes to tap the expertise of nationals living abroad.

C. Roles of United Nations organizations

56. Organizations of the United Nations system should play a major part in the coordination and harmonization of ICT policies and in promoting specific application areas, such as distance education, telemedicine, tele-work and e-governance. Focus should be maintained on promoting inter-agency cooperation and coordination with a view to national and regional ICT capacity-building in the ESCWA region. Furthermore, there is a need for producing more up-to-date information on regional and national ICT indicators, such as ICT penetration, infrastructure, industry, services, content, opportunities and obstacles.

57. The proposed international conference referred to above would constitute a suitable opportunity for United Nations organizations and specialized agencies to review their strategies with a view to promoting the following:

(a) Cooperative activity between components of the United Nations system and the private sector in support of ICT capacity-building, including setting up pilot projects to accelerate dissemination of ICTs in priority sectors;

(b) Regional networks to enhance collaboration in ICT capacity-building measures through bilateral or multilateral links among United Nations agencies, on the one hand, and between them and the public and private sectors, on the other;

(c) Public debate on the structure, content and privacy issues of ICT services.

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Summary

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Information technology, globalization and development: challenges and opportunities in the region of the Economic Commission for Europe

Selected issues

I. Introduction

1. Rapid progress and expansion of information and communication technology (ICT) has been the hallmark of human civilization development in the last decade of the twentieth century. It has dramatically changed ways of doing business, profoundly affected economic and social life and rendered the established concepts of national independence and sovereignty largely obsolete. ICT development has also been one of the most important driving forces behind the process of globalization. As with every major technological advance, the ICT revolution opens new vast opportunities but also poses challenges and risks. It is a chance, not a gift. Those who fail to seize the new opportunities risk falling behind.

2. This summary paper gives a brief overview of the implications of ICT for economic and social development in the member countries of the Economic Commission for Europe (ECE) and suggests appropriate policy responses. It shows that ICT can stimulate economic growth by adding new products, increasing productivity and introducing new management and marketing techniques. On the other hand, rapid expansion of ICT may also lead to some negative developments, including the risk of further widening the economic disparities between and within countries in the ECE region.

3. The paper argues that specific policy actions are needed both at the national and regional levels to prevent the "digital divide", to contain possible negative effects of ICT and to help the less advanced countries to benefit fully from the ICT revolution. These actions would include measures aimed at expanding "digital connectivity" across societies and upgrading the skills and knowledge levels of less advanced countries and social groups in the ECE region. They would also include regulatory measures to increase the security and efficiency of ICT applications, in particular Internet-based businesses. Such policy actions in the context of a national ICT programme are suggested in the paper. ECE is well placed to be instrumental in sharing good practices in ICT applications in its areas of work and in providing technical assistance to transition economies in their efforts to develop national strategies of ICT development and use.

II. ICT and globalization

4. In its essence, globalization means dramatically increased international interdependence and an urgent need for much more international cooperation. Links between ICT and globalization are frequently emphasized. Indeed, ICT is a vehicle of globalization. It reduces the cost and increases the speed of communication, thereby allowing for faster and cheaper transactions, as well as for decentralization and more efficient spatial distribution of many manufacturing activities within integrated production networks involving many countries. In Europe, application of electronic documentation and reporting in customs procedures helps to remove many technical barriers to international trade. Through its impact on the speed and scope of commercial transactions, ICT enhances globalization and economic integration in the ECE region and worldwide. International integration, in turn, establishes an enabling environment for ICT development and diffusion.

5. But globalization is not yet truly global. In the ECE region, expansion of trade and foreign direct investment (FDI) is much faster within the European Union and the more advanced transition countries. Many less advanced countries in south-east Europe and the Commonwealth of Independent States (CIS) do not, for various reasons, significantly benefit from the ICT-based economic integration and the process of globalization in general (though they may painfully feel some of its adverse consequences, such as currency crises or fluctuations of commodity prices).

III. ICT and economic growth

6. No doubt, ICT can produce important economic and social benefits. New technologies improve economic efficiency and open up new business

opportunities, facilitate diffusion of technical progress and new ideas and establish direct links between people and enterprises across different countries and regions. They stimulate scientific progress, open new possibilities for acquiring education and knowledge and enrich human choices. ICT is also at the heart of the "new economy" paradigm that attempts to explain the recent astonishing economic growth performance in the United States of America, mainly through productivity gains arising from the rapid and universal development and diffusion of ICT.

7. The impact of ICT on economic growth works through three main channels. First, it expands total output directly through adding new goods and services — such as computers, software, magnetic card machines, mobile phones, satellite TV and new financial services. Second, it increases productivity through innovations in the existing production processes, such as the use of computer-guided robots, application of new software, electronic commerce or wireless communications. Third, ICT applications improve overall efficiency through innovations going beyond the production process proper; these include new methods of management, sales, organization and marketing, such as cross-border production networking, "outsourcing" or advertising and sales through the Internet.

8. Production of ICT goods and services has been expanding rapidly in the last decade. There are no systematic statistics for the ECE region, but partial data indicate that the share of ICT goods in gross domestic product (GDP) increased in most countries by 0.5 to 2 percentage points between 1993 and 1997. Even faster has been the expansion of certain ICT-based services, such as data communication, e-business services, software, systems design and integration and consulting.

9. ICT-based process innovations (such as the application of computers and digital communication systems) help to improve labour productivity and quality of products. Firm-level productivity data reveal that information technology has a positive impact on marginal output. Recent studies have shown that growth in computer use in the United States economy in 1992-1996 contributed between 0.32 and 0.60 of a percentage point to total output growth. In countries such as the United States, the United Kingdom of Great Britain and Northern Ireland and Canada, the contribution of ICT capital to output growth accounted for over one half of the total growth contribution of fixed capital during 1990-1996. Similar efficiency effects can be expected to emerge in services. In trade, shifting sales from traditional retail networks to electronic networks (Internet) allows consumers to save the time they spend on searching for goods, while producers and distributors economize on stocks and on the costs of maintaining necessary commercial space.

10. As regards the organization of production activities, ICT allows for removing traditional spatial barriers in production and opens up new possibilities for geographical decentralization of production, with different production phases located in separate places offering the best economic and business conditions but still functionally integrated through ICT. An important implication of this tendency is that it enhances the role of small and medium-sized enterprises (SMEs) as they obtain more opportunities to become integrated through "outsourcing" and subcontracting into the activities of large corporations.

11. One important and promising sequel to the rapid ICT development in this area is the tendency to shift some highly sophisticated ICT-based activities to low-cost countries. In the past, many infotech companies from western Europe and North America subcontracted increasingly large parts of their software application services to countries such as Ireland or Israel. This pattern of subcontracting can spread very quickly to the transition countries of eastern Europe, where education levels are relatively high and the basic communication infrastructure is in place. Cross-border outsourcing and subcontracting has already been evident in more advanced countries (such as Hungary, the Czech Republic or Estonia).

12. Rapid development of ICT-based financial services has dramatically increased international capital mobility. This allows for better allocation of financial resources in the whole ECE region and worldwide, but may also lead to foreign exchange rate instability and currency crises. The "tides" of international financial capital that take place instantaneously through electronic means are driven by largely subjective perceptions by investors of differentials in the national risk-adjusted rates of return on assets. The massive flows may be particularly destabilizing for small open economies in transition, leading to very wide fluctuations in nominal and real exchange rates and, consequently, inflicting considerable damage on the real sector.

13. Large efficiency gains can be obtained through wider and deeper applications of ICT across-the-board in the economy and society. All sectors are likely to gain from ICT development, not only those directly producing ICT, even though most technologically advanced sectors will probably gain much more than traditional sectors. Moreover, ICT applications also promise large gains in other, non-economic sectors, such as education, health care and public administration.

14. Probably the largest potential for exploiting new opportunities exists in mass education, including primary and secondary schools as well as vocational training. Computer literacy and broad access to the Internet open practically unlimited education possibilities for all, establishing a basis for a knowledge-based society. True, some minimum level of knowledge is always required to effectively exploit those possibilities, but on the other hand access to the Internet is itself knowledge-stimulating and enhances self-education.

IV. ICT and economic inequalities: the risk of a "digital divide"

15. By its very nature, ICT applications are not universally and equally spread. Available statistics show that ICT intensity is generally higher in the countries with a higher level of economic development as measured by GDP per capita. This implies that the more developed countries can also gain proportionately more from ICT. The benefits are likely to accrue mostly to the main users, including high-tech and knowledge-intensive sectors, such as sophisticated manufacturing, financial and medical services, media and entertainment, electronic commerce, research and development. Given the generally higher share of those sectors in developed countries economies, the gains may be absolutely and relatively higher in those countries. This raises the risk of a "digital divide" in the ECE region and worldwide.

16. In Europe, this challenge has acquired an important regional dimension, arising from the rapidly expanding interrelations between the more affluent and ICT-advanced countries of western Europe on the one side, and much poorer countries with economies in transition being at varying stages of reforms on the other side. Catching up with the western European income and wealth levels is an important goal for the acceding countries and a component of the European Union's enlargement strategy. It is also essential to ensure a balanced development of ICT in the region as a whole so that the other countries with economies in transition are not left behind.

17. There are instances where ICT applications seem to narrow, rather than widen, the existing inequalities. For example, by opening up more opportunities for SMEs and self-employed individuals through outsourcing and subcontracting and by lowering barriers to entry in many industries, ICT may contribute to a more balanced distribution of growth effects across the whole economy. Similarly, allowing for more spatial dispersion of production activities (deglomeration), ICT may facilitate economic development of many rural and backward areas.

18. Demand-side statistics on ICT uses are still scarce and fragmentary but available data show large imbalances in the consumers' structure. The use of ICT equipment has been concentrated in higher-income segments of the market, mostly among wealthy individual and institutional consumers and investors. There are obvious reasons for this unequal distribution. First, there is a price barrier: ICT products are still relatively expensive. Second, the professional use of ICT-based products is naturally concentrated in high-skills professions and high-tech sectors (banking, media, electronics and telecommunications) where incomes generated are generally higher. Third, the use of ICT-based products increases with the level of education and knowledge, which in turn is correlated with the income levels. This pattern suggests that ICT-generated gains tend to concentrate in the countries, sectors and social groups with higher levels of incomes and education.

19. Data on Internet hosts and Internet users confirm the positive correlation between Internet use intensity and per capita incomes. The number of Internet users in European Union member countries is generally higher, relative to total population, than in transition countries, although there are some important exceptions (for example, Estonia and Slovenia). Similar disparities are evident among the transition countries. ICT production and application, including especially Internet installation and uses, is much better developed in the most advanced transition countries, such as Hungary, the Czech Republic, Estonia, Slovenia and Slovakia. While this pattern again

confirms that income levels are important, there are two other factors that help to explain the differences: FDI inflows and national policies.

20. More advanced transition countries have attracted much higher FDI inflows than other countries, especially in ICT-intensive sectors such as telecommunication and banking. Data for the ECE region show a positive correlation between Internet intensity and FDI intensity. Acquisitions of domestic enterprises by foreign companies under national privatization programmes allowed for their rapid modernization, including wider applications of ICT. This has had a direct and sizeable positive impact on overall productivity.

21. Apart from FDI and income differentials, another important reason for the considerable disparities among transition countries are simply different policy priorities adopted by national Governments. For instance, while countries such as Estonia and Hungary have followed an explicit policy of rapid Internet development, most of CIS countries have not yet considered ICT to be an important priority or have failed to translate this priority into concrete policy actions. Differences in national policies with respect to ICT development can also be discerned from international comparisons of prices for Internet access. Available data show wide disparities in the Internet access prices in the ECE region, with access charges in the transition countries being generally much higher than in the more developed ECE countries. The data show also that countries with low access charges have generally higher Internet intensity.

V. ICT and economic and social risks

22. Accelerated ICT development and, especially, Internet applications are likely to have an important impact on the tax revenues of individual Governments. For instance, within the European Union customers may shift their purchases to countries where indirect taxes are lower. Moreover, sales of some "virtual" products (such as music, movies and software) are not taxed at all. Effective tax collection may become more difficult because of the anonymity of buyers and also because of specific regulations in some countries that forbid taxes on Internet sales (for example, the Internet Tax Freedom Act of 1998 in the United States).

23. ICT and globalization have made individual national economies much more dependent on each other and on global trends. Traditional concepts of national sovereignty and independence need to be revised. Political elites need to learn how to adjust their political programmes and attitudes to the new situation. A key policy challenge is how to benefit from increased openness while at the same time reducing and controlling the risks, including susceptibility to financial crises and a backlash from nationalist and isolationist sentiments.

24. Internet, satellite TV and digital communication have accelerated the universal dissemination of ideas, values and behaviour patterns that mostly originated in rich countries and reflect essentially the western culture. Generally, the form and content of electronically transmitted information is neither controlled nor restricted. The rapid expansion of a "global culture" may conflict with traditional values that are at the roots of local communities in less advanced countries, for example, in the Balkans and in the CIS. This may result in accelerated and sometimes violent disintegration of those communities, entailing a number of social tensions and other phenomena, such as xenophobia, illegal migration, criminality and drug abuse.

25. In trade via the Internet, consumer rights and security of transactions are not always well protected. Regulatory frameworks for electronic commerce in most countries are still in *statu nascendi*. Rapid development of ICT has opened up possibilities for new forms of crimes: fraud, electronic theft, illegal data copying and use, breach of confidentiality with respect to classified information, virus infections and sabotage ("cyber-crimes"). The recent attacks on the portals of Internet companies in the United States have demonstrated that the Internet remains a vulnerable and imperfect means of business communication. Moreover, the explosive growth of sales and advertising through the Internet may distort the consumption patterns.

VI. The need for policy actions

26. The opportunities and challenges involved in ICT development call for policy and regulatory actions aimed at ensuring that all potential of ICT can best serve human development objectives. ICT development and use should be made more universal across

countries, especially in less developed countries and countries with economies in transition. The three fundamental constraints in those countries include: (a) lack of ICT equipment (computers, infrastructure); (b) insufficient level of knowledge and skills needed to operate, use and benefit from ICT; and (c) lack of an appropriate policy and regulatory framework to enhance and support ICT application while preventing negative effects. Paragraphs 27 to 34 suggest a set of policy directions with a view to overcoming these constraints and thereby maximizing the opportunities offered by ICT.

27. Limited availability of ICT equipment, including Internet infrastructure, is primarily a reflection of a general scarcity of capital resources in less advanced countries. In this sense, it is a part of a more general problem of elaborating and implementing a long-term development strategy required for sustained rapid economic growth. A fundamental part of such a strategy would be to establish a supportive institutional and policy environment for business activities in a country. The institutional and regulatory aspects of a successful development strategy were recently re-emphasized by the Secretary-General in his Millennium report. Another strategic policy objective should be to develop mass education and training with the aim of building a knowledge-based society. Only such a society can be expected to prosper in the long run through sustained economic growth generated by knowledge- and skill-induced productivity gains.

28. One possible policy initiative for the transition countries would be to adopt national ICT development programmes organized around two main objectives: raising education levels and expanding "connectivity".

29. School programmes should include more courses on computer uses and Internet applications at all levels. Access to training programmes on computer uses and Internet applications should be offered free of charge to the target groups, including students, school teachers, SMEs, local government officials and the unemployed. Communal "hubs" for Internet access (in schools, libraries and local cultural centres) should be sponsored by the Government.

30. An important precondition for rapid diffusion of ICT and Internet applications is a well-developed telecommunications infrastructure. National Governments should liberalize markets for telecom services and contribute to developing fast and inexpensive "connectivity". The recent rapid expansion of mobile telecommunications gives the less advanced countries a chance to close the gap in the traditional fixed-line telecommunication systems.

31. It is now well recognized that Internet access should be offered at subsidized prices or free of charge, especially to the target groups (students, SMEs and local communities). But this conflicts with the predominantly private ownership and operation of the existing Internet infrastructure. While ICT development and Internet applications have so far been private-sector driven, they are increasingly perceived as public goods. A solution should be sought in a balanced public-private partnership and broader involvement of public authorities, including information campaigns, deregulation of monopolies, financial incentives and direct subsidies.

32. Rapid expansion of ICT applications calls for a coherent regulatory framework to minimize the risks of social tensions and pathologies, and to ensure that ICT contributes best to economic and human development. In the area of Internet-based trade, the required regulations would cover the rights and obligations of parties in e-contracts, protection of private banking and personal data, information content, protection of intellectual property rights, effective supervision and control of Internet use. At the same time, the adopted regulatory framework should not be excessively restrictive and must not inhibit market competition or further innovations. Close collaboration with business communities is strongly desired in this area.

33. An important area of ICT applications is public administration. Establishing direct communication with citizens via the Internet, Governments can improve the quality of public services, increase accountability and transparency of government decisions, provide better information on their activities and obtain valuable feedback reactions from the citizens. Developing "e-government" can contribute to making bureaucracy leaner and more efficient and help fighting pathologies such as corruption and cronyism (for example, in public procurement).

34. An important task for Governments in the ECE region would be to elaborate and enforce a system of statistical data collection on ICT, especially in areas such as electronic commerce. In this area, uniform standards of reporting could be developed and applied across the ECE region.

35. A number of ECE countries have taken major steps in adopting ICT-related policies. The case of Ireland is a good example. As a result of the Irish Government's strategy of encouraging FDI, 7 out of the world's top 10 software companies had production facilities in Ireland in 1997. By 1998, Ireland had become the second largest world exporter of packaged software, with the total amount of revenues generated by the software sector exceeding US$ 7.4 billion and the export value of US$ 6.6 billion. The success was a combined outcome of good macroeconomic policies, liberal business-friendly microeconomic policies and the availability of high-skilled, dedicated manpower.

36. Another example to follow is that of Estonia. Within only a few years, the country has become the leader in Internet use in eastern Europe. A political consensus has been reached by major political parties to spend each year 0.2 per cent of GDP on developing Internet access, in particular in primary and secondary schools. This well-focused policy has become a national priority. The programme, called "The Tiger Leap", was launched in 1995. By May 2000, more than 70 per cent of Estonian schools had direct access to the Internet.

37. The national policy should be buttressed by appropriately structured international assistance, with special programmes targeted at various ICT applications, training and sharing best practices and experiences of more advanced countries in the area of telecommunication policies or electronic commerce regulations.

VII. The role of the Economic Commission for Europe

38. Over the years, ECE has accumulated considerable expertise in many ICT-related areas. Among many important projects implemented under its auspices, two deserve special attention. The first is UN/CEFACT, an initiative to facilitate business processes through recommendations aimed at applying information technologies in business activities and reducing the procedural, legal and physical constraints to them. The second is the Internet Enterprise Development Project, initiated in 1998 and focused on exploring the central issues in electronic commerce and Internet-based enterprise development.

39. Building upon the experience from these and other activities, ECE as a regional organization, with its Euro-Atlantic membership and focus on transition countries, can be the forum for discussing region-wide initiatives to address various aspects of ICT development. Bringing together national Governments, business leaders, the media, representatives of consumer groups and international organizations, ECE could act as a platform for sharing good policy practices and experiences between more developed and less developed member countries and raise public awareness of the opportunities and risks connected with ICT.

40. The ECE could adopt a long-term approach by strengthening the ICT dimension in all its areas of work, in particular trade, statistics and transport. This would include ICT-related activities for all countries of the region (particularly in the field of standards-setting) as well as ICT capacity-building activities targeted at economies in transition. The possibility of a long-term programme of activities along these lines could be examined by the Commission in the light of the views and directions emerging from the high-level segment of the substantive session of 2000 of the Economic and Social Council.

41. Such a programme should be part of a collective action and standardized approach in this area, through synergies with other regional and subregional initiatives such as the "Europe — An Information for All" initiative of the European Union and through coordination with other concerned international organizations, in particular the World Trade Organization, the World Intellectual Property Organization and the International Telecommunication Union.